

Bachelor of Computer Applications

Proposed Scheme of Syllabus

(CHOICE BASED CREDIT SYSTEM)

W.E.F ACADEMIC SESSION 2021-22

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) DEGREE**

**GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY
SECTOR-16C, DWARKA, NEW DELHI-110078**

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I. BACHELOR OF COMPUTER APPLICATIONS PROGRAMME DETAILS

1. Aim:

The programme covers rudimentary to advance concepts in Computer Science and its applications in various domains. An exceptionally broad range of topics covering current trends and technologies in the field of information technology and computer science are included in the syllabus. The hands on sessions in Computer labs using various Programming languages and tools are also given to have a deep conceptual understanding of the topics to widen the horizon of students' self- experience.

Students, who choose BCA Programme, develop the ability to think critically, logically, analytically and to use and apply current technical concepts and practices in the core development of solutions in the multiple domains.

The knowledge and skills gained with a degree in Computer Application prepare graduates for a wide range of jobs in education, research, government sector, business sector and industry. In broader perspective the mission of teaching BCA is to produce employable IT workforce, that will have sound knowledge of IT and business fundamentals that can be applied to develop and customize solutions for various Enterprises.

2. Programme Objectives:

It is envisioned that the graduates passing out BCA degree, will achieve the following objectives and will be able to

Programme Objectives (POs)	Description
PO1	Understand the fundamental concepts of Computers, Software hardware and peripheral devices and evolution of computer technologies.
PO2	Familiarized with Business environment and Information Technology and its Applications in different domains.
PO3	Gain knowledge to identify, explain and apply functional programming and object-oriented programming techniques and use of databases to develop computer programs.
PO4	Analyze, design, implement and evaluate computerized solutions to real life problems, using appropriate computing methods including web applications.
PO5	Understand the front end and backend of software applications.
PO6	Gain expertise in at least one emerging technology.
PO7	Acquire knowledge about computer architecture and organization, networks, network devices and their configuration, protocols, security concepts at various level etc.

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PO8	Apply techniques of software validation and reliability analysis to the development of computer programs.
PO9	Acquire Technical, Communication and management Skills to convey or present information, applications, instructions, policies, procedures, decisions, documentations etc. verbally as well as in writing.
PO10	Recognize the various issues related to society, environment, health and vivid cultures and understand the responsibilities to contribute in providing the solutions.
PO11	Acquire technical skills to lead a productive life in the society as a professional or as an entrepreneur.

3. Programme Learning Outcomes:

The completion of the BCA Programme shall enable a student to:

- i) To design, implement, and evaluate computer-based system, process, component, or program to meet desired needs by critical understanding, analysis and synthesis
- ii) Identify applications of Computer Science in other fields in the real world to enhance the career prospects
- iii) Realize the requirement of lifelong learning through continued education and research.
- iv) Use the concepts of best practices and standards to develop user interactive and abstract application
- v) Understand the professional, ethical, legal, security, social issues and responsibilities.

The detailed list of programme learning outcomes is as follows:

PLO	Attribute	Description
PLO1	Communication Skills	The student should be able to communicate the technical information both orally and in writing professionally.
PLO2	Use of Software Tools	Create, select, adapt and apply suitable tools and technologies to a wide range of computational activities.
PLO3	Technical Skills	Acquire necessary knowledge of technical, scientific as well as basic managerial and financial procedures to analyze and solve real world problems within their work domain
PLO4	Domain Awareness	Clarity on both conceptual and application oriented skills in commerce, Finance & Accounting and it Applications in Business context.
PLO5	Technical Support	Must be able to provide technical support for various software applications.
PLO6	Analysis and	Ability to analyze research and investigate complex computing

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	investigation of Complex Computing Problems	problems through design of experiments, analysis and interpretation of data and synthesis of the information to arrive at valid conclusions.
PLO7	Design / Development of Solutions	Apply the knowledge gained in core courses to a broad range of advanced topics in computer science, to learn and develop sophisticated technical products independently.
PLO8	Imbibe Cyber Ethics	Awareness on ethics, values, sustainability and creativity aspects of technical solutions.

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II. CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses.

1. Types of courses in CHOICE BASED CREDIT SYSTEM (CBCS)

1.1 Core Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

1.2 Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

a) **Discipline Specific Elective (DSE) Course:** Elective courses offered by the main discipline/subject of study are referred as Discipline Specific Electives.

b) **Project work/Dissertation** is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A candidate studies such a course on his own with an advisory support by a teacher/faculty member. The work done will have to be submitted in writing as a project report / dissertation.

c) **Generic Elective (GE) Course:** Elective courses that are generic or interdisciplinary by nature chosen from an unrelated discipline/ subject with an intention to seek exposure beyond discipline/s of choice are called Generic Electives. Students will have to choose one elective each in the third and fourth semester from the lists GE1 to GE2 given in this syllabus.

1.3 Ability Enhancement Courses (AEC)

The Ability Enhancement (AE) Courses are the course that lead to Knowledge enhancement. These are of two types.

a) **AE Compulsory Course (AECC):** Environmental Studies, English Communication/MIL Communication.

b) **AE Elective Course (AEEC):** AEEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc. These courses are to be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.

III PROGRAMME STRUCTURE:

The BCA programme is a three-year course of 160 credits divided into six-semesters. A student is required to complete 150 credits for the completion of course and the award of degree.

	Academic Year	Odd Semester	Credits	Even Semester	Credits
Part – I	First Year	Semester I	26	Semester II	26
Part – II	Second Year	Semester III	27	Semester IV	27
Part – III	Third Year	Semester V	27	Semester VI	27

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Total Credits – 162	80		82
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Eligibility Criteria: The detailed eligibility criteria for BCA programme for an academic session will be provided in the admission brochure. However, for quick reference, the eligibility criteria of BCA programme for academic session 2021-22 is as follows:

“Pass in 12th Class of 10+2 of CBSE or equivalent with a minimum of 50% marks in aggregate* with pass in English (core or elective or functional). Mathematics or (Computer Science / Informatics Practice / Computer Applications / Multimedia & Web Technology / Data Management Application / Web Application as compulsory subject of non-vocational stream with 50 theory and 50 practical ratio). OR Three year Diploma in a branch of Engineering from a polytechnic duly approved by All India Council for Technical Education and affiliated to a recognized examining body with a minimum of 50% marks in aggregate.”

Admission Criteria: Admission shall be based on the merit of the written test /CET.

IV INSTRUCTION FOR QUESTIONS PAPER SETTER:

- Question Paper setter for each course must refer the instructions provided with the detailed syllabus of the specific courses.
- The question paper shall be preferably set from the prescribed text books and reference books, mentioned in the syllabus.

V CREDIT ALLOCATION (BCA PROGRAMME OF STUDY)

Course	Credits	
	Theory + Practical	Theory + Tutorial
	Core Course (6 credits) (12 papers)	Core Course (4 credits) (7 papers)
Core Course Theory 19 Papers	12x4=48	7x3=21
Core Course Practical / Tutorial* 19 Papers	12x2=24	7x1=7
Elective Course (4 Papers of 5 credits each, 5 Papers of 4 credits each and 7 Papers of 2 credits each)		
A.1. Discipline Specific Elective (4 Papers)	4x4 = 16	
A.2. Discipline Specific Elective Practical/Tutorial* (4 Papers)	1x4 = 04	
B.1. Generic Elective/ Interdisciplinary (2 Papers)		2x3 = 06
B.2. Generic Elective Practical/ Tutorial* (2 Papers)		2x1 = 02

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1.Ability Enhancement Compulsory Courses(AECC) (3 Papers of 4 credit each and 1 Paper of 6 Credit including Minor & Major Project)	$1 \times 4 + 1 \times 6 = 10$	$2 \times 4 = 8$
2. Ability Enhancement Compulsory Courses(AECC) (2 Papers of 2 credit)		$2 \times 2 = 04$
Skill Enhancement Courses (SEC) (5 Papers of 2 credit each)	$5 \times 2 = 10$	
Co-Curricular Activities	2	
Total credit 162	114	48

*Wherever there is practical, there will be no tutorial and vice-versa

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III. CBCS COURSE STRUCTURE FOR BCA PROGRAMME

1. SEMESTER WISE PLACEMENT OF THE COURSES

Semester	CORE COURSE (18)	Ability Enhancement Compulsory Course (AECC) (3)	Skill Enhancement Course (SEC) (2)	Elective: Discipline Specific (DSE) (5)	Elective: Generic (GE) (2)
I Total Credits 26	CC1 (4) Discrete Mathematics	AECC 1 (4) Technical Communication			
	CC2 (4+2) Programming using 'C' Language				
	CC3(4+2) Fundamentals of IT & Computers				
	CC4 (4+2) Web Technologies				
II Total Credits 26	CC5 (4) Applied Mathematics	AECC2 (2) Environment Studies	SEC -1 (2)		
	CC6 (4+2) Web Based Programming				
	CC7 (4+2) Data Structure And Algorithm Using 'C'				
	CC8 108 (4+2) Database Management System				
III Total Credits 27	CC9 (4) Computer Network	AECC3 (2) Human Values and ethics	SEC -2 (2)	DSE- 1 (4+1)	Any course from the list GE-1(4)
	CC10 (4) Computer Organization and Architecture				
	CC11 (4+2) Object Oriented Programming with C++				
IV Total Credits 27	CC12(4+2) Java Programming	AECC4 (4) Introduction to Management & Entrepreneurship Development	SEC-3 (2) Personality Development Skills	DSE -2 (4+1)	Any course from the list GE-2 (4)
	CC13 (4+2) Software Engineering				
V Total Credits	CC14 (4+2) Operating System & Linux Programming	AECC 5 Minor Project (4)	SEC-4 (2) Summer Internship	DSE -3 (4+1)	
	CC15(4+2) Computer Graphics				

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27	CC 16 (4) Cloud computing				
VI Total Credits 29	CC17 (4) Datawarehousing and Data Mining	AECC 6 Major Project (6)	SEC-5 (2) Seminar/ Conference Presentation	DSE -4 (4+1)	
	CC18 (4) E-Commerce				
	CC19 (4+2) Internet of Things				
	NSS / NCC / Cultural Clubs / Technical Society / Technical Clubs	Mandatory (2)			

1.1 Skill Enhancement Course 1(SEC)

SEC 1 (choose one) Skill development course from the following

- (i) MOOC course from SWAYAM / NPTEL of minimum 2 credits. Certificate is Mandatory for the degree
- (ii) Front End Design Tool VB.Net Lab
- (iii) Statistical Analysis using Excel
- (iv) Designing Lab Photoshop

SEC 2 (choose one)

- (i) MOOC course From Swayam / NPTEL of minimum 2 credits. Certificate is Mandatory for the degree
- (ii) Designing Lab CorelDraw
- (iii) ASP.Net
- (iv) AR/VR

1.2 Discipline Specific Electives (DSE) (Choose any One Group of DSE)

DSE-A – Data Science & Analytics

- 1. Basics of Python Programming
- 2. Introduction to Data Science
- 3. Data Visualization & Analytics
- 4. Machine Learning with Python

DSE-B – Artificial Intelligence & Machine Learning

- 1. Basics of Python Programming
- 2. Introduction to Artificial Intelligence
- 3. Machine Learning with Python
- 4. Deep Learning with Python

DSE-C– Cyber Security

- 1. Cyber Security
- 2. Network Security
- 3. Web Security
- 4. IT Acts and Cyber Laws

DSE-D – Software Development

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1. Basics of Python Programming
2. Web Development with Python
3. Web Development with Java & JSP
4. Mobile Application Development

1.3 Generic Elective (GE) for BCA Students

GE 1 (choose any One)

- (i) Principles of Management & Organizational Behaviour
- (ii) Any One Paper Offered as open elective by other School / Department / Programme

GE 2 (choose any One)

- (i) Digital Marketing
- (ii) Principles of Accounting
- (iii) Any One Paper Offered as open elective by other School / Department / Programme

1.4 Generic (Open) Electives for other undergraduate programmes

The following Core courses of BCA programme may be offered as Generic Elective for other undergraduate programmes. Maximum number of students from other School / Department / Programme should not exceed 20% of total intake for the programme.

S.No.	Semester	Subject Code	Subject Name
1	I	BCA 105 BCA 173	Fundamentals of Computers & IT Practical – II IT Lab
2	I	BCA 107 BCA 175	Web Technologies Practical-III Web Tech Lab
3	II	BCA 108 BCA 176	Database Management System Practical – VI DBMS Lab
4	III	BCA 205 BCA 271	Object Oriented Programming using C++ Practical – VI C++ Lab
5	III	BCA 211	Basics of Python Programming
6	VI	BCA 304	E-Commerce

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SEMESTER WISE EVALUATION SCHEME

Based on the above-mentioned course categories the semester wise Evaluation scheme of BCA Programme will be as follows:

FIRST SEMESTER EXAMINATION

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory								
BCA 101	Discrete Mathematics	Core Course Theory	3	1	4	25	75	100
BCA 103	Programming Using 'C' Language	Core Course Theory	3	1	4	25	75	100
BCA 105#	Fundamentals of Computers & IT	Core Course Theory	3	1	4	25	75	100
BCA 107#	Web Technologies	Core Course Theory	3	1	4	25	75	100
Ability Enhancement Compulsory Course (AECC)								
BCA 109	Technical Communication	AECC	3	1	4	25	75	100
Core Course Practicals								
BCA 171	Practical – I 'C' Prog. Lab	Core Course Practical	0	4	2	40	60	100
BCA 173#	Practical – II IT Lab	Core Course Practical	0	4	2	40	60	100
BCA 175#	Practical-III Web Tech Lab	Core Course Practical	0	4	2	40	60	100
Bridge Course (Mandatory for Students from Non Mathematics background)								
BCA 181 ⁺	Bridge Course in Mathematics	Mandatory for Students from Non Mathematics background	2	0	0	Pass Grade	-----	-----
	Total Credits				26			800

⁺ Non Credit subject mandatory for the students who do not have mathematics in 12th std. The student has to obtain at least pass marks (40). The examination of this paper shall be conducted by the concerned teacher teaching the course / paper as Teacher's Continuous Evaluation for total 100 marks. Only the Pass / Fail status is to be specified on the marksheet of the examination and the result of the student. Passing is mandatory for student not having mathematics in 12th std.

Generic Elective (GE) for other undergraduate programmes

TOTAL MARKS: 800

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SEMESTER WISE EVALUATION SCHEME

SECOND SEMESTER EXAMINATION

Code No.	Paper	Course Category	L	T/P	Credits	Marks Internal	Marks External	Max Marks
Core Course Theory								
BCA 102	Applied Mathematics	Core Course Theory	3	1	4	25	75	100
BCA 104	Web based Programming	Core Course Theory	3	1	4	25	75	100
BCA 106	Data Structure And Algorithm Using 'C'	Core Course Theory	3	1	4	25	75	100
BCA 108#	Database Management System	Core Course Theory	3	1	4	25	75	100
Ability Enhancement Compulsory Course (AECC)								
BCA 110	Environment Studies	AECC	2	0	2	25	75	100
*Skill Enhancement Course (AEEC) (Choose any One)								
BCA 132	**MOOC course from SWAYAM / NPTEL	SEC-1	0	0	2	100	0	100
BCA 134	Front End Design Tool VB.Net Lab	SEC-1	0	4	2	100	0	100
BCA 136	Statistical Analysis using Excel	SEC-1	0	4	2	100	0	100
BCA 138	Designing Lab Photoshop	SEC-1	0	4	2	100	0	100
Core Course Practical								
BCA 172	Practical-IV WBP Lab	Core Course Practical	0	4	2	40	60	100
BCA 174	Practical – V DS Lab	Core Course Practical	0	4	2	40	60	100
BCA 176#	Practical – VI DBMS Lab	Core Course Practical	0	4	2	40	60	100
	Total				26			900

*NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute)

Generic Elective (GE) for other undergraduate programmes

TOTAL MARKS: 900

****Instructions for MOOC course**

- MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
- For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.

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3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 2 credits for the MOOC Course even then 2 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and a result declared for these papers. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

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SEMESTER WISE EVALUATION SCHEME

THIRD SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 201	Computer Network	Core Course Theory	3	1	4	25	75	0	100
BCA 203	Computer Organization and Architecture	Core Course Theory	3	1	4	25	75	0	100
BCA 205#	Object Oriented Programming with C++	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 207	Human Values and Ethics	AECC	2	0	2	25	75	0	100
*Discipline Specific Elective (Choose any One)									
BCA 211#	Basics of Python Programming	DSE-1	4	1	5	25	50	25	100
BCA 213	Cyber Security	DSE-1	4	1	5	25	50	25	100
**Generic Elective (Choose any One)									
BCA 221	Principles of Management & Organizational Behaviour	GE-1	3	1	4	25	75	0	100
BCA 223	Open Elective offered by other Department/School /programme	GE-1	3	1	4	25	75	0	100
***Skill Enhancement Course (AEEC) (Choose any One)									
BCA 231	****MOOC course from SWAYAM / NPTEL	SEC-2	0	0	2	100	0	0	100
BCA 233	Designing Lab CorelDraw	SEC-2	0	4	2	100	0	0	100
BCA 235	ASP.Net	SEC-2	0	4	2	100	0	0	100
BCA 237	AR/VR	SEC-2	0	4	2	100	0	0	100
BCA	Cyber Ethics	SEC-2	2	0	2	100	0	0	100

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239									
Core Course Practical									
BCA 271#	Practical – VII C++ Lab #	Core Course Practical	0	4	2	40	0	60	100
	Total				27				800

Generic Elective (GE) for other undergraduate programmes

* First Subject from Discipline specific chosen group

** Choose one subject from list of GE-1

*** NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment

****Instructions for MOOC course

1. MOOC Course should be done from SWAYAM/NPTEL as per the guidelines of UGC.
2. For securing the credits, the student is required to complete the assessment of the course and to provide the certificate of the course done from SWAYAM/NPTEL.
3. The fees (if any) for the registration and/or assessment of the MOOC course must be borne by the student only.
4. If the student secures more than 2 credits for the MOOC Course even then 2 credits shall be considered for this subject and the grade/marks provided by assessing authority shall be transferred to the university by the institution where the student is studying. The University's Examination Division shall take the result of the MOOC course on record and a result declared for these papers. The student must submit the result of such papers to their respective institution. All the results for the MOOC courses may be submitted before the completion of other requirements including credits requirement.

TOTAL MARKS: 800

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SEMESTER WISE EVALUATION SCHEME

FOURTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 202	Java Programming	Core Course Theory	3	1	4	25	75	0	100
BCA 204	Software Engineering	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 206	Introduction to Management & Entrepreneurship Development	AECC	3	1	4	25	75	0	100
*Discipline Specific Elective (Choose any One)									
BCA 212	Introduction to Data Science	DSE-2	4	1	5	25	50	25	100
BCA 214	Introduction to Artificial Intelligence	DSE-2	4	1	5	25	50	25	100
BCA 216	Network Security	DSE-2	4	1	5	25	50	25	100
BCA 218	Web Development Using Python and Django	DSE-2	4	1	5	25	50	25	100
**Generic Elective (Choose any One)									
BCA 222	Digital Marketing	GE-2	3	1	4	25	75	0	100
BCA 224	Principles of Accounting	GE-2	3	1	4	25	75	0	100
BCA 226	Open Elective offered by other Department/ School /programme	GE-2	3	1	4	25	75	0	100
***Skill Enhancement Course (AEEC)									
BCA 232	Personality Development Skills	SEC-3	2	0	2	100	0	0	100
Core Course Practical									
BCA 272	Practical – VIII Java Lab	Core Course Practical	0	4	2	40	0	60	100
BCA 274	Practical – IX SE Lab	Core Course Practical	0	4	2	40	0	60	100
	Total				27				800

* Second Subject from Discipline specific chosen group

** Choose one subject from list of GE-2

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***** NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment**

**Summer Training will be held for 4 weeks after the end of fourth semester.
Viva-Voce will be conducted in fifth semester.**

TOTAL MARKS: 800

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SEMESTER WISE EVALUATION SCHEME

FIFTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Credits	Marks Internal	Marks External		Max Marks
							Th	Pr	
Core Course Theory									
BCA 301	Operating System & Linux Programming	Core Course Theory	3	1	4	25	75	0	100
BCA 303	Computer Graphics	Core Course Theory	3	1	4	25	75	0	100
BCA 305	Cloud Computing	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 307	Minor Project	AECC	0	8	4	40	0	60	100
*Discipline Specific Elective (Choose any One)									
BCA 311	Data Visualization & Analytics	DSE-3	4	1	5	25	50	25	100
BCA 313	Machine Learning with Python	DSE-3	4	1	5	25	50	25	100
BCA 315	Web Security	DSE-3	4	1	5	25	50	25	100
BCA 317	Web Development with Java & JSP	DSE-3	4	1	5	25	50	25	100
***Skill Enhancement Course (AEEC)									
BCA 331	Summer Training Project	SEC-4	0	0	2	100	0	0	100
Core Course Practical									
BCA 371	Practical – X Linux - OS Lab	Core Course Practical	0	4	2	40	0	60	100
BCA 373	Practical – XI CG Lab	Core Course Practical	0	4	2	40	0	60	100
	Total				27				800

* Third Subject from Discipline specific chosen group

***NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute) i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment. Evaluation will be based on Summer Training held after fourth semester.

TOTAL MARKS: 800

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SEMESTER WISE EVALUATION SCHEME

SIXTH SEMESTER EXAMINATION

Code No.	Paper	Course Type	L	T/P	Cre dits	Marks Internal	Marks External		Max Mar ks
							Th	Pr	
Core Course Theory									
BCA 302	Data Ware Housing & Data Mining	Core Course Theory	3	1	4	25	75	0	100
BCA 304#	E- Commerce	Core Course Theory	3	1	4	25	75	0	100
BCA 306	Internet of Things	Core Course Theory	3	1	4	25	75	0	100
Ability Enhancement Compulsory Course (AECC)									
BCA 308	**Major Project	AECC	----	12	6	40	0	60	100
*Discipline Specific Elective (Choose any One)									
BCA 312	Machine Learning with Python	DSE-4	4	1	5	25	50	25	100
BCA 314	Deep Learning with Python	DSE-4	4	1	5	25	50	25	100
BCA 316	IT Act and Cyber Laws	DSE-4	4	1	5	25	75		100
BCA 318	Mobile Application Development	DSE-4	4	1	5	25	50	25	100
***Skill Enhancement Course (AEEC)									
BCA 332	Seminar/ Conference Presentation	SEC – 5	0	0	2	100	0	0	100
Core Course Practical									
BCA 372	Practical – XII IOT Lab	Core Course Practical	0	4	2	40	0	60	100
\$ BCA 374	NSS / NCC / Cultural Clubs / Technical Society / Technical Clubs	Mandatory	0	0	2	100	0	0	100
	Total				29				800

*Fourth Subject from Discipline specific chosen group.

** The student shall do the Major project in the Discipline Specific Area/Curriculum based subject /any emerging technology.

*** NUES (Non – University Examination Subject) – Only Internal Assessment by the Institute i.e. the assessment shall be conducted by the institution for all 100 marks as Teacher's Continuous Assessment .Evaluation will be based on the presentation on any latest

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technology/research article in in-house/external seminar/conference and will be conducted by the college committee only.

Generic Elective (GE) for other undergraduate programmes

\$ **NUES (Non – University Examination Subject)** Comprehensive evaluation of the students by the concerned coordinator of NCC / NSS / Cultural Clubs / Technical Society / Technical Clubs out of 100 marks as per evaluation schemes worked out by these societies / organizations at the institution / University level. The coordinators shall be responsible for the evaluation of the same. These activities shall start from the 1st semester and evaluation shall be conducted at the end of 6th semester for the students admitted in the first semester.

Note: Any Elective Subject will be offered if minimum 1/3 rd of the total strength of students in the class will opt for it.

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Course Code BCA 301

Course Name: Operating System & Linux Programming

INSTRUCTIONSTOPAPERSETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each Question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. Working and functionalities of operating system
2. Understand the concept of process scheduling, memory management, deadlock and file system
3. Understand basic commands of Linux and shell scripts.

PRE-REQUISITES:

1. Basic understanding of hardware and software of computer organization.

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the basic concept of Operating System with the help of Unix and Linux Architecture.	BTL2	PO1, PO4
CO2	Understand the concept of Processes, Process Scheduling, Process Synchronization and applying process commands in Linux environment.	BTL3	PO1, PO2, PO4, PO5
CO3	Understand the concept of memory management and deadlock.	BTL2	PO1, PO2, PO4, PO5
CO4	Understand the concept of file Systems, Types and Access Methods by using Linux commands.	BTL3	PO1, PO2, PO4

UNIT-I

No. of Hours: 12 **Chapter/Book Reference: TB1 [Chapter 1]; TB2 [Chapters 1, 2, 3, 4, 5]**

Introduction: What is an Operating System, Functions of Operating System, Simple Batch Systems; Multi programmed Batch systems, Time-Sharing Systems, Personal-computer systems, Parallel systems, Distributed Systems, Real-Time Systems.

Introduction to Linux: Architecture of Linux OS, Basic directory structure of Linux, Basic commands of Linux:-man,info,help,whatis,apropos, basic directory navigation commands like

Bachelor of Computer Applications

cat,mkdir,rmdir ,cd, mv, cp, rm, ,file, pwd ,date,cal,echo,bc,ls,who,whoami, hostname, uname, tty,alias

Vi Editor: vi basics, Three modes of vi Editor, how to write, save, execute a shell script in vi editor

UNIT-II

No. of Hours: 12 **Chapter/Book Reference: TB1 [Chapters 3, 5, 6]; TB2 [Chapter 9]**

Processes: Process Concept, Process Scheduling, Operation on Processes

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms

Process Synchronization: Background, The Critical-Section Problem, Semaphores solution to critical section problem

Process related commands in Linux: ps, top, pstree, nice, renice and system calls

UNIT-III

No. of Hours: 12 **Chapter/Book Reference: TB1 [Chapters 7, 8, 9]**

Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Segmentation, Paging

Virtual Memory: Demand Paging, Performance of Demand Paging, Page Replacement, Page-replacement Algorithms, Allocation of Frames, Thrashing

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT-IV

No. of Hours: 10 **Chapter/Book Reference: TB1 [Chapter 10]; TB2 [Chapter 6]**

Information Management: Introduction, File Concept, Access methods, Directory and Disk structure, File Protection

Linux File Security: Permission types, Examining permissions, changing permissions (symbolic method numeric method)

TEXT BOOKS:

[TB1] Silberschatz and Galvin, “Operating System Concepts”, John Wiley & Sons, 10 th Ed. 2018

[TB2] Sumitabha Das, “Unix Concepts and Application”, TMH

REFERENCE BOOKS:

REFERENCES: [R1] Madnick E., Donovan J., “Operating Systems”, Tata McGraw Hill, 2011

REFERENCES: [R2] [R2] Tannenbaum, “Operating Systems”, PHI, 4th Edition, 2015

REFERENCES: [R3] Sivaselvan, Gopalan, “A Beginner’s Guide to UNIX”, PHI Learning

Bachelor of Computer Applications

Course Code: BCA 303
Course Name: Computer Graphics

L T C
3 1 4

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Concept of Computer graphics, types of display devices and their techniques.
2. Methods of drawing of graphic objects on the display devices.
3. Concepts of viewport, mapping of real world objects to display device, clipping
4. Knowledge of projection concepts and their types

PRE-REQUISITES:

1. Programming in C/C++

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Develop basic knowledge of computer generated graphics, their applications, display devices and drawing of graphic objects on display devices.	BTL2	PO1, PO6
CO2	To develop knowledge of various graphics 2D transformation operation, their mathematical calculations.	BTL4	PO4, PO8
CO3	To learn about the surfaces and curves, properties of curves and shading of surfaces	BTL2	PO4
CO4	To give basic knowledge of 3D projection and identifying hidden surfaces to be removed.	BTL2	PO1

UNIT – I

No. of Hours: 11 **Chapter/Book Reference: TB1, TB2**

Introduction: Introduction to computer graphics, Applications of Computer Graphics, Non Interactive and interactive graphics, Conceptual Framework for Interactive Graphics. Introduction to Raster and Random scan display, Characteristics of display devices, Aliasing and Antialiasing, Introduction to latest display technologies (LED, OLED, Curved LED display)

Scan Conversion

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Scan Converting Lines using DDA & Bresenham's Algorithm, Scan Converting Circles using Bresenham's algorithm.

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1, TB2, RB3

Clipping

Cohen- Sutherland Algorithm, Cyrus-Beck Algorithm

Geometrical Transformations

2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, Window-to-Viewport Transformation, Introduction of Matrix Representation of 3D Transformations of translation, scaling and rotation (without derivation).

UNIT – III

No. of Hours: 11 Chapter/Book Reference: TB1, TB2

Representing Curves

Introduction to Polygon Meshes and its types, Parametric Cubic Curves: parametric and geometric continuity, Hermite, Bezier & B-Spline.

Surfaces

Surface rendering- Basic Illumination, Effect of ambient lighting and distances, Shading models- Gourard Shading, phong model.

UNIT – IV

No. of Hours: 11 Chapter/Book Reference: TB1, TB2

Three Dimensional Viewing: Introduction, Representation of Three-dimensional objects, Projections, Parallel projections: Orthographic Projections, Oblique Projections. Perspective Projection,

Hidden Surface Removal: Depth-Buffer (z-buffer) method, Depth-sorting Method (Painter's algorithm)

TEXT BOOKS:

TB1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles & Practice, 2000, Pearson

TB2. Chennakesava R. Alavla "Computer Graphics", PHI Learning Pvt. Limited

REFERENCES BOOKS:

RB1. D. Hearn & Baker: Computer Graphics with OpenGL, Pearson Education, Third Edition, 2009.

RB2. Foley, J.D. & Van Dam, A: Fundamentals of Interactive Computer Graphics.

RB3. Rogers & Adams, "Mathematical Elements for Computer Graphics", McGraw Hill, 1989.

Bachelor of Computer Applications

Course Code: BCA 305
Course Name: Cloud Computing

L T C
3 1 4

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Understand current cloud computing technologies, including technologies for different cloud services.
2. Analyze the components of cloud computing
3. Perform Large data processing in the cloud

PRE-REQUISITES:

1. Basics of Computer Network
2. Knowledge of Operating System and Databases.

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Overview of Cloud Computing	BTL1	PO1, PO2, PO3, PO7
CO2	Understanding Cloud Computing Architecture	BTL2	PO1, PO2, PO3, PO4, PO7,
CO3	Working with Parallel and Distributed Computing	BTL3	PO1, PO2, PO3, PO4, PO5
CO4	Understanding the Concept of Virtualization	BTL4	PO1, PO2, PO3, PO6, PO7

UNIT – I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 10], TB2 [Chapters - 1, 2]

Cloud Computing Overview –Services of Internet, Origins of Cloud computing – Cloud components – Essential characteristics – On-demand self-service, The vision of cloud computing – Characteristics, benefits, and Challenges ahead

UNIT – II

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapter - 4], TB2 [Chapters - 5, 6, 17, 18]

Cloud Computing Architecture-Introduction – Internet as a Platform, The cloud reference model - Types of clouds - Economics of the cloud, Computing platforms and technologies, Cloud computing

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economics, Cloud infrastructure - Economics of private clouds - Software productivity in the cloud - Economies of scale: public vs. private clouds.

UNIT – III

No. of Hours: 11 **Chapter/Book Reference: TB1 [Chapter - 2], TB2 [Chapter - 11]**

Principles of Parallel and Distributed Computing: Parallel vs. distributed computing - Elements of parallel computing - Hardware architectures for parallel processing, Approaches to parallel programming - Laws of caution.

UNIT – IV

No. of Hours: 11 **Chapter/Book Reference: TB1 [Chapter - 3], TB2 [Chapter - 8]**

Virtualization: Introduction - Characteristics of virtualized environments - Taxonomy of virtualization techniques - Virtualization and cloud computing - Pros and cons of virtualization - Technology example: VMware: full virtualization, Types of hardware virtualization: Full virtualization - partial virtualization - para virtualization

TEXT BOOKS:

TB1. Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, “Mastering Cloud Computing” - Foundations and Applications Programming, MK publications, 2013.

TB2. Gautam Shroff, “Enterprise Cloud Computing: Technology, Architecture, Applications” by Cambridge University Press, 2010.

REFERENCE BOOKS:

RB1. Michael J.Kavis, “Architecting the Cloud: Design Decisions for Cloud Computing Service Models (SaaS, PaaS, and IaaS)”, John Wiley & Sons Inc., Jan 2014.

Bachelor of Computer Applications

Course Code: BCA 307
Course Name: Minor Project

L	T/P	C
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PROJECT REPORT

All the students are required to submit a report based on the project work done by them during the sixth semester.

SYNOPSIS (SUMMARY/ABSTRACT) :

All students must submit a summary/abstract separately with the project report. Summary, preferably, should be of about 3-4 pages. The content should be as brief as is sufficient enough to explain the objective and implementation of the project that the candidate is going to take up. The write up must adhere to the guidelines and should include the following:

- Name / Title of the Project
- Statement about the Problem
- Why is the particular topic chosen?
- Objective and scope of the Project
- Methodology (including a summary of the project)
- Hardware & Software to be used
- Testing Technologies used
- What contribution would the project make?

TOPIC OF THE PROJECT- This should be explicitly mentioned at the beginning of the Synopsis. Since the topic itself gives a peep into the project to be taken up, candidate is advised to be prudent on naming the project. This being the overall impression on the future work, the topic should corroborate the work.

OBJECTIVE AND SCOPE: This should give a clear picture of the project. Objective should be clearly specified. What the project ends up to and in what way this is going to help the end user has to be mentioned.

PROCESS DISCRIPTION: The process of the whole software system proposed, to be developed, should be mentioned in brief. This may be supported by DFDs / Flowcharts to explain the flow of the information.

RESOURCES AND LIMITATIONS: The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware/software or the data from the industry. The limitation of the proposed system in respect of a larger and comprehensive system must be given.

CONCLUSION: The write-up must end with the concluding remarks- briefly describing innovation in the approach for implementing the Project, main achievements and also any other important feature that makes the system stand out from the rest.

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The following suggested guidelines must be followed in preparing the Minor Project Report:

Good quality white A4 size paper should be used for typing and duplication. Care should be taken to avoid smudging while duplicating the copies.

Page Specification: (Written paper and source code)

- Left margin - 3.0 cms
- Right margin- 2.0 cms
- Top margin 2.54 cms
- Bottom margin 2.54 cms
- Page numbers - All text pages as well as Program source code listing should be numbered at the bottom center of the pages.

Normal Body Text: Font Size: 12, Times New Roman, Double Spacing, Justified. 6 point above and below para spacing

Paragraph Heading Font Size: 14, Times New Roman, Underlined, Left Aligned. 12 point above & below spacing.

Chapter Heading Font Size: 20, Times New Roman, Centre Aligned, 30 point above and below spacing. **Coding Font size :** 10, Courier New, Normal

Submission of Project Report to the University : The student will submit his/her project report in the prescribed format. The Project Report should include:

1. One copy of the summary/abstract.
2. One hard Copy of the Project Report.
3. The Project Report may be about 75 pages (excluding coding).

FORMAT OF THE STUDENT PROJECT REPORT ON COMPLETION OF THE PROJECT

- I. Cover Page as per format
- II. Acknowledgement
- III. Certificate of the project guide
- IV. Synopsis of the Project
- V. Main Report
 - i. Objective & Scope of the Project
 - ii. Theoretical Background Definition of Problem
 - iii. System Analysis & Design vis-a-vis User Requirements
 - iv. System Planning (PERT Chart)
 - v. Methodology adopted, System Implementation & Details of Hardware & Software used System Maintenance & Evaluation
 - vi. Detailed Life Cycle of the Project
 - a. ERD, DFD
 - b. Input and Output Screen Design
 - c. Process involved
 - d. Methodology used testing

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- e. Test Report, Printout of the Report & Code Sheet
- VI. Coding and Screenshots of the project
- VII. Conclusion and Future Scope
- VIII. References

Formats of various certificates and formatting styles are as:

1. Certificate from the Guide

CERTIFICATE

This is to certify that this project entitled “ xxxxxx xxxxx xxxxx xxxx xxxx xxx” submitted in partial fulfillment of the degree of Bachelor of Computer Applications to the “xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx” through xxxxxx xxxxx done by Mr./Ms._____, Roll No. _____ is an authentic work carried out by him/her at _____ under my guidance. The matter embodied in this project work has not been submitted earlier for award of any degree to the best of my knowledge and belief.

Signature of the student

Signature of the Guide

2. Project Report Cover Page Format:

Title of the Project/report
(Times New Roman, Italic, Font size = 24)

**Submitted in partial fulfilment of the requirements for the award of the
degree of
Bachelor of Computer Applications
(Bookman Old Style, 16 point, centre)**

Submitted to:
(Guide Name)

Submitted by:
(Student's name)
Roll No
College Name

3. Self-Certificate by the students

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SELF CERTIFICATE

This is to certify that the dissertation/project report entitled “.....” is done by me is an authentic work carried out for the partial fulfilment of the requirements for the award of the degree of Bachelor of Computer Applications under the guidance of _____. The matter embodied in this project work has not been submitted earlier for award of any degree or diploma to the best of my knowledge and belief.

Signature of the student

Name of the Student

Roll No.

4. ACKNOWLEDGEMENTS

In the “Acknowledgements” page, the writer recognizes his indebtedness for guidance and assistance of the thesis adviser and other members of the faculty. Courtesy demands that he also recognize specific contributions by other persons or institutions such as libraries and research foundations. Acknowledgements should be expressed simply, tastefully, and tactfully.

Bachelor of Computer Applications

Course Code: BCA 311

Course Name: Data Visualization & Analytics

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4	1	5

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Students will develop relevant programming abilities.
2. Students will demonstrate proficiency with statistical analysis of data.
3. Conduct exploratory data analysis using visualization.
4. Craft visual presentations of data for effective communication.

PRE-REQUISITES:

1. Basics of Python Programming (BCA-206)

COURSE OUTCOMES(COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Illustrating the features of Multithreading in python.	BTL2	PO1, PO2, PO3, PO5
CO2	Analyzing data using suitable python library.	BTL2	PO1, PO2, PO3, PO7, PO10
CO3	Visualizing data using Matplotlib, Seaborn library.	BTL3	PO1, PO2, PO3, PO4
CO4	Develop python applications with database connectivity operations.	BTL3	PO1, PO2, PO3, PO4

UNIT-I

No. of Hours: 11 Chapter/Book Reference: TB1 [Chapters - 1, 2], TB2 [Chapters - 1, 2]

Analytics: Basic Nomenclature, Analytics Process Model, Analytics part in different profiles, Analytical Model Requirements.

Data Sources for data collection, Sampling and Sampling distribution, Types of data elements, Missing Values, Outlier Detection and Treatment, Standardization using Min/max and z-score, categorization, Segmentation.

UNIT-II

No. of Hours: 11 Chapter/Book Reference: TB2 [Chapter - 3], TB3 [Chapter - 7]

Statistical Hypothesis Testing, p-Values, Confidence Intervals.

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Correlation, Simpson's Paradox, Some Other Correlational Caveats, Correlation and Causation, Correlation Statistics-ANOVA.

UNIT-III

No. of Hours: 11 **Chapter/Book Reference: TB3[Chapter - 3], TB4 [Chapter - 8]**

Data Visualization: Graphs in Python: Line Graph, Bar charts, Pie-charts, Scatter plots, multiple plots, Subplots, Legends, Changing figure Size, Styling plots using Matplotlib Library. Functions like relplot(), displot() and catplot ().

Seaborn Library: Introduction, Line plot, Dist plot, Lmplot, Count plot, Color palettes.

UNIT-IV

No. of Hours: 11 **Chapter/Book Reference: TB5 [Chapter - 4], TB3 [Chapter - 7]**

GUI Programming: Creating User-interface, GUI Widgets with Tkinter, Creating Layouts, Check Box, Radio Buttons, List Box, Menus, Menus Options, Dialog Boxes

Database Access: Database Connectivity Operations: Create, Insert, Select, Delete, Drop, Update.

TEXT BOOKS:

TB1. Analytics in a Big Data World, Essential Guide to Data Science and its Application, Bart Baesens, Wiley Big Data Series.

TB2. Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data Published by John Wiley & Sons, Inc

TB3. Data Science from Scratch, 2nd Edition by Joel Grus Publisher(s): O'Reilly Media, Inc

TB4. Agile tools for real world data: Python for Data Analysis by Wes McKinney, O'Reilly

TB5. Python and Tkinter Programming JOHN E. GRAYSON

REFERENCE BOOKS:

RB1. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly, 2nd Edition, 2015.

RB2. ReemaThareja, "Python Programming using Problem Solving Approach", Oxford University Press, 1" Edition, 2017. **RB4.** Joel Grus, "Data Science from Scratch", O'Reilly, 2no Edition ,2019.

RB3. Tony Gaddis, "starting out with Python", Pearson, 3'd Edition, 2014.

RB4. Y. Daniel Liang, "Introduction to Programming Using Python", Pearson, 1" Edition, 201,3.

RB5. Programming in Python 3: A Complete Introduction to the Python Language (2nd Edition), Mark Summerfield

List of Practicals		
S.No.	Detailed Statement	Mapping to CO#
Core Practicals		
1.	Write a program to create a DataFrame have E-commerce data and perform selection of row/column using loc() and iloc()	CO1,CO2,CO3
2.	Create a Series object S5 containing numbers. Write a program to store the square of the series values in object S6. Display S6's values which are >15.	CO1, CO2, CO4
3.	Write a program to fill all missing values in a DataFrame with zero.	CO1, CO2
4.	Program for combining DataFrames using concat(), join(),merge()	CO1, CO2

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5.	Write a program to draw bar graph for the following data for the Medal tally of CWG-2018:- <table><tr><td>Gold</td><td>Silver</td><td>Bronze</td><td>Total</td></tr><tr><td>26</td><td>20</td><td>20</td><td>66</td></tr></table>	Gold	Silver	Bronze	Total	26	20	20	66	CO1, CO2,CO3
Gold	Silver	Bronze	Total							
26	20	20	66							
6.	Implementing Line plot, Dist plot, Lmplot, Count plot using Seaborn library	CO1, CO2,CO3								
Application Based Practicals (Implement minimum 5 out of 10 practicals)										
7.	Create a DataFrame namely aid that stores aid (Toys,books,uniform,shoes) by NGO's for different states. Write a program to display the aid for:- (a) Books and Uniforms only (b) Shoes only	CO1, CO2,CO5								
8.	Create a DataFrame ndf having Name, Gender, Position, City, Age, Projects. Write a program to summarize how many projects are being handled by each position for each city? Use pivot()	CO1, CO2,CO5								
9.	Marks is a list that stores marks of a student in 10 unit test. Write a program to plot Line chart for the student's performance in these 10 test.	CO1, CO2								
10.	Write a program to plot a horizontal bar chart from the height of some students.	CO1, CO2,CO3								
11.	Write a program to implement ANNOVA.	CO1, CO2,CO3,CO5								
12.	Write a program to show correlation between two randomly generated numbers .	CO1, CO2,CO4,CO5								
13.	Write a program to implement Covariance.	CO1, CO2, CO5								
14.	Create a GUI based form for admission purpose for your college	CO1, CO2, CO3								
15.	The created GUI based application form is to connected to a database and use insert query to enter data.	CO1, CO2, CO5								
Note: 1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.										

Bachelor of Computer Applications

Course Code: BCA 313

Course Name: Machine Learning with Python

L T C
4 1 5

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. To make student able to learn mathematical concepts, and algorithms used in machine learning techniques for solving real world problems and developing new applications based on machine learning.
2. To introduce students to the state-of-the-art concepts and techniques of Machine Learning using Python.

PRE-REQUISITES:

1. Basics of Python Programming

COURSE OUTCOMES(COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO#
CO1	Explain machine learning concepts on real world applications and problems.	BTL2	PO1, PO2, PO8
CO2	Analyze and Implement Regression techniques.	BTL2, BTL3	PO1, PO4, PO5, PO7
CO3	Solve and design solution of Classification problem	BTL3, BTL6	PO2, PO3, PO4, PO8
CO4	Understand and implement Unsupervised learning algorithms	BTL2, BTL3	PO4, PO5, PO6, PO8
CO5	Interpret various machine learning algorithms in a range of real world applications.	BTL3	PO2, PO6, PO7

UNIT-I

No. of Hours: 11

Chapter / Book Reference: TB1 [Chapters - 1, 3, 4, 8, 9], TB2 [Chapters - 1, 4]

Introduction to Machine Learning, Why Machine learning, Types of Machine Learning Problems, Applications of Machine Learning. Supervised Machine Learning- Regression and Classification. Binary Classifier, Multiclass Classification, Multilabel Classification. Performance Measures-

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Confusion Matrix, Accuracy, Precision & recall, ROC Curve. Advanced Python- NumPy, Pandas. Python Machine Learning Library Scikit-Learn, Linear Regression with one Variable, Linear Regression with Multiple Variables, Logistic Regression.

UNIT-II

No. of Hours: 11 **Chapter / Book Reference: TB1 [Chapters - 5, 6, 7], TB2 [Chapter - 6]**

Supervised learning Algorithms: Decision Trees, Tree pruning, Rule-based Classification, Naïve Bayes, Bayesian Network. Support Vector Machines, k-Nearest Neighbor, Ensemble Learning and Random Forest algorithm.

UNIT - III

No. of Hours: 11 **Chapter / Book Reference: TB1 [Chapter - 10], TB3 [Chapters - 2, 6]**

Artificial Neural Networks, HebbNet, Perceptron, Adaline, Multilayer Neural Network, Architecture, Activation Functions, Loss Function, Hyper parameters, Gradient Descent, Backpropagation, Variants of Backpropagation, Avoiding overfitting through Regularization, Applications of Neural Networks.

UNIT – IV

No. of Hours: 11 **Chapter/Book Reference: TB1 [Chapter - 8], TB2 [Chapter - 7], TB3 [Chapter - 4]**

Unsupervised learning algorithms: Introduction to Clustering, K-means Clustering, Hierarchical Clustering, Kohonen Self-Organizing Maps. Implementation of Unsupervised algorithms. Feature selection and Dimensionality reduction, Principal Component Analysis.

TEXT BOOKS:

TB1. GeronAurelien, “Hands-On Machine Learning with Scikit-Learn & TensorFlow”, O’REILLY, First Edition, 2017.

TB2. U Dinesh Kumar and Manaranjan Pradhan, “Machine Learning using Python”, Wiley, 2019.

TB3. Fausett Laurence, “Fundamentals of Neural Networks”, Pearson, Ninth Edition, 2012.

REFERENCE BOOKS:

RB1. Tom Mitchell, “Machine Learning”, First Edition, McGraw- Hill, 1997.

RB2. Budd T A, "Exploring Python", McGraw-Hill Education, 1st Edition, 2011.

RB3. Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 1st Edition, 2017.

List of Practical

S.No.	Problem Statement	Mapping to CO#
1.	Extract the data from the database using python.	CO1
2.	Write a program to implement linear and logistic regression	CO2
3.	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.	CO3
4.	Write a program to implement k-nearest neighbors (KNN) and Support Vector Machine (SVM) Algorithm for classification	CO3

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5.	Implement classification of a given dataset using random forest.	CO3
6.	Build an Artificial Neural Network (ANN) by implementing the Back propagation algorithm and test the same using appropriate data sets.	CO3
7.	Apply k-Means algorithm k-Means algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Python ML library classes in the program.	CO4
8.	Write a program to implement Self - Organizing Map (SOM)	CO4
9.	Write a program for empirical comparison of different supervised learning algorithms	CO4
10.	Write a program for empirical comparison of different unsupervised learning algorithms	CO4

Note:

1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor.

2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

Bachelor of Computer Applications

Course Code: BCA 315
Course Name: Web Security

L T C
4 1 5

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:

1. Students will be able to learn the techniques needed for providing protection and security to our data and information resources over internet.
2. To understand and learn web application and its Architecture.
3. Students will be able to develop awareness regarding Cyber laws and crimes.
4. Students will be able to understand the internet and web application security issues.
5. Students will be able to learn and understand wireless network security issues.
6. To learn and understand the concept of web services, ajax and other technology which are helpful.

PRE-REQUISITES:

1. Computer Network
2. C/C++/HTML (Programming Knowledge of C/C++/HTML/JS)

COURSE OUTCOMES(COs):

After completion of this course, the learners will be able to:-

CO#	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Define overall web security infrastructure, components, issues and basic concept etc.	BTL1	PO1, PO4, PO7
CO2	Describe briefly various types of security like social media security, email security, web application and web services security etc. Explain Web related services.	BTL2	PO1, PO2, PO4, PO5, PO7
CO3	Apply and implementing various vulnerabilities for Ethically hacking a websites / Web Applications.	BTL3	PO1, PO4, PO6, PO8
CO4	Focusing Penetration Testing, Computer Forensics.	BTL4	PO1, PO2, PO7
CO5	Evaluate different web security algorithms with the help of program.	BTL5	PO1, PO3, PO4, PO6, PO7, PO8
CO6	Design and implement XSS attacks, SQL Injection attack, password hashing and cracking.	BTL6	PO1, PO3, PO4, PO7, PO8

Bachelor of Computer Applications

UNIT-I

No. of Hours: 12 **Chapter/Book Reference: TB1 [Chapter - 1], TB2 [Chapters - 1, 3]**

Components of Internet, Weak points of Internet, HTTP vs HTTPS, Overview of web authentication technologies, Web application architecture, Recent attack trends, Types of Web Security, Web infrastructure security/Web application firewalls, managing configurations for web apps, Techniques of Web Hacking, Methods of Attacking users, Importance of Web Application Security, Web Application Security vs Network Security. Social Media security - What is Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs Collecting data from Online social media. Trust, credibility, and reputations in social systems.

UNIT-II

No. of Hours: 11 **Chapter/Book Reference: TB1 [Chapters - 4, 6], TB2 [Chapters - 8, 11]**

Internet and Web Application Security: Email security (PGP and SMIME), Web Security: Web authentication, Injection Flaws, Programming Bugs and Malicious code, XSS and SQL Injection, Memory corruption exploits, Web Browser Security, E-Commerce Security

UNIT-III

No. of Hours: 11 **Chapter/Book Reference: TB1 [Chapter - 5], TB2 [Chapters - 1, 10, 11]**

Wireless Network Security: Components, Security issues, Securing a Wireless Network, Mobile Security Management: Disaster Recovery, Ethical Hacking, Penetration Testing, Computer Forensics, Cyber laws and crime, Security Audit and Investigation, Cyber Security Solutions

UNIT-IV

No. of Hours: 10 **Chapter/Book Reference: TB1 [Chapter - 6], TB2[Chapters - 5, 10, 11]**

Web services overview, Honeypot, XML security, AJAX attack trends and common attacks, REST security, Content Security Policy Serialization security, Clickjacking, DNS rebinding, HTML5 security, Logging collection and analysis for web apps, Security testing, IPv6 impact on web security

TEXT BOOKS:

TB1. Joel Scam bray, Vincent Liu, Caleb Sima, “Hacking Exposed Web Applications, 3rd Edition”, McGraw-Hill, October 2010

TB2. Baloch, R., Ethical Hacking and Penetration Testing Guide, CRC Press, 2015.

REFERENCE BOOKS:

RB1. Dafydd Stuttard, and Marcus Pinto, The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, 2nd Edition, John Wiley & Sons, 2011.

RB2. Council, Ec. , Computer Forensics: Investigating Network Intrusions and Cybercrime, Cengage Learning, Second Edition, 2010.

RB3. John W. Ritting house, William M. Hancock, “Cyber Security Operations Handbook”, Elsevier Pub

RB4. Deborah G Johnson, “Computer Ethics”, 4th Edition, Pearson Education Publication.

RB5. Earnest A. Kallman, J.P Grillo, “Ethical Decision making and IT: An Introduction with Cases”, McGraw Hill Publication.

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List of Practicals		
S.No.	Detailed Statement	Mapping to CO#
1.	Implement the Security in web browsers (Mozilla Firefox/Google Chrome/IE)	CO1, CO2
2.	Analysis of the security and privacy features and issues in Ecommerce & social media websites i.e., Facebook, Twitter and Google+	CO1, CO2
3.	Implement CAPTCHA to keep the website secure.	CO3, CO6
4.	Implement Password hashing and cracking technique	CO3, CO6
5.	Implement SQL Injection Attack	CO3, CO6
6.	Implement XSS attacks	CO3, CO6
7.	Implement Malicious Code & Memory Corruption Exploits	CO3, CO6
8.	Implement the process of SSL Certificate	CO4
9.	Implement Reconnaissance with the help of Google and Whois	CO5, CO6
10.	Implement Clickjacking, DNS rebinding & Ajax Attack	CO5, CO6
Note: 1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

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Course Code: BCA 317

Course Name: Web Development with Java & JSP

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4 1 5

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following:-

1. Learn Web development using Java.
2. Understand the basics of J2EE and Web development.
3. Understand and implement Servlet
4. Creating and implementing JDBC application.
5. Implement JSP and JSF concepts.
6. Understand the fundamentals of Hibernate, Struts and springs.

PRE-REQUISITES:

1. Programming Knowledge of Java
2. HTML

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:-

CO #	Detailed Statement of the CO	*BT Level	Mapping to PO #
CO1	Understand the concept of HTML, CSS and Java Script.	BTL2	PO3, PO4, PO5
CO2	Understand J2EE architecture, web application structure and web architecture models.	BTL2	PO3, PO4, PO5, PO8
CO3	Creating and configuring Servlets.	BTL6	PO3, PO4, PO5
CO4	Understand JDBC architecture and design database applications using JDBC.	BTL2	PO3, PO4, PO5, PO8
CO5	Design applications using JSP and JSF.	BTL3	PO3, PO4, PO5, PO8
CO6	Elaborate the functional programming concepts of Hibernate, Struts and Springs.	BTL1	PO3, PO4, PO5, PO7, PO8

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UNIT – I

No. of Hours: 11 **Chapter/Book Reference: TB1 [Chapters - 1, 13, 31, 32, 33], TB2 [Chapters - 1, 2, 18], TB3 [Chapters - 2, 3, 4, 11, 14]**

Introduction to HTML, CSS and Java Script: Content, layout, and styling of web page

J2EE and Web Development: Java Platform, J2EE Architecture Types, Types of Servers in J2EE Application, HTTP Protocols and API, Web Application Structure, Web Containers and Web Architecture Models.

Swings: Introduction and comparison with AWT controls.

UNIT – II

No. of Hours: 11 **Chapter/Book Reference: TB1 [Chapter - 37], TB2[Chapters - 34, 41, 42]**

Introduction to Java EE Web Component: Overview of Servlet, Servlet Life Cycle, Types of Servlet, HTTP Methods Structure and Deployment descriptor Servlet Context and Servlet Config interface, State Management: client and server side,

JDBC Programming: JDBC Architecture, Types of JDBC Drivers, Introduction to major JDBC Classes and Interface, Creating simple JDBC Application, Database operations using JDBC, Types of Statement (Statement Interface, Prepared Statement, Callable Statement), Exploring Result Set Operations.

UNIT – III

No. of Hours: 11 **Chapter/Book Reference: TB2 [Chapters - 43, 44]**

Java Server Pages: Introduction to JSP, Comparison with Servlet, JSP Architecture, JSP Life Cycle, JSP Directives, JSP Action, JSP Standard Tag Libraries, JSP Session Management.

Develop Web Applications with JSF: JavaServer Faces (JSF) framework, architecture of JSF web applications, development view of a JSF application.

UNIT – IV

No. of Hours: 11 **Chapter/Book Reference: TB1 [Chapters - 22, 37, 39], TB2[33, 36]**

Java Beans, Java Web Frameworks: Spring MVC: Java Beans, Spring Introduction, Spring Architecture, Spring MVC Module, Bean life cycle, Spring API.

Hibernate and Struts: Java Beans, Introduction to Hibernate, Hibernate Architecture, Hibernate Mapping Types, Introduction to Struts, core components, architecture, Interceptors, validation.

Advance Networking: Networking Basics, Introduction of Socket, Types of Socket, Socket API, TCP/IP client sockets, URL, TCP/IP server sockets, Datagrams, java.net package Socket, ServerSocket, InetAddress, URL, URLConnection.

TEXT BOOKS:

TB1. Herbert Schildt, "Java - The Complete Reference", Oracle Press, 9th Edition, 2014

TB2. Y. Daniel Liang, "Introduction to Java Programming, Comprehensive Version, Pearson.

TB3. Sams Teach Yourself HTML, CSS & JavaScript Web Publishing in One Hour a Day by Laura Lemay, Rafe Colburn, Jennifer Kyrnin, 2015

REFERENCE BOOKS:

RB1. E. Balaguruswamy, "Programming with Java", Tata McGraw Hill, 4th Edition, 2009.

RB2. Cay Horstmann, "Computing Concepts with Java 2 Essentials", John Wiley & Sons, 2nd Edition, 1999.

RB3. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective", Pearson.

RB4. Jakarta Struts Cookbook, by Bill Siggelkow, O'Reilly Media, Inc. 2005

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List of Practicals		
S. No.	Detailed Statement	Mapping to CO#
Core Practicals (Implement minimum 8 out of 10 practicals)		
1.	Create a webpage that prints your name to the screen, print your name in Tahoma font, print a definition list with 5 items, Create links to five different pages, etc.	CO1
2.	Program to demonstrate Swing components.	CO1
3.	Configure Apache Tomcat and write a hello world JSP page.	CO1
4.	Write a java program that connects to a database using JDBC and does add, delete and retrieve operations.	CO3
5.	Create and Develop a web application using JSF.	CO3
6.	Write a program to implement a Java Beans to set and get values.	CO2
7.	Create a Java application to demonstrate Socket Programming in Java.	CO5
8.	Write a program to retrieve hostname--using methods in InetAddress class	CO2
Application Based Practicals (Implement minimum 5 out of 10 practicals)		
9.	Write a client-server program which displays the server machine's date and time on the client machine.	CO1
10.	Create a table in the database containing the columns to store book details like: book name, authors, description, price and URL of the book's cover image. Using JSP and JDBC retrieve the details in the table and display them on the webpage	CO3
11.	Write a program to create a login page using Java Beans.Also validate the username and password from the database.	CO1
12.	Create a form for inputting text and uploading image using struts	CO4
13.	Create a Student Registration application using Hibernate.	CO4
14.	Write a program to implement MVC using Spring Framework	CO4
Note: 1. In total 10 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

Bachelor of Computer Applications

Course Code: BCA 331

Course Name: Summer Training Project

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Summer Training Project Guidelines

Objective:

All the students enrolled for BCA Programme, have to undergo compulsory summer training/ Project of minimum 06 weeks in an organization in the IT field. The aim of the project is to give the students an integrated experience in solving a real-life problem by applying knowledge and skills gained on completion of theory papers and in-house practical papers during BCA course. It provides an occasion for students to realize the importance of resource and time management, ownership of task towards deliverables, innovation and efficiency in the task management. It also provides a good opportunity for students to build, enhance and sustain high levels of professional conduct and performance and evolves a problem solver frame of mind in students at early stage. It also prepares students for taking up responsible assignments in the corporate establishment.

General Guidelines:

1. The project should be original, of real-life value, and not copied from existing material from any source. A student should ensure that he understands what is expected by preparing a requirement document of his understanding and get it reviewed by the guide.
2. Design document should also be reviewed and code should also be peer reviewed.
3. A user manual has to be prepared and reviewed.
4. Testing has to be thorough and at various levels, followed by an acceptance test based on the requirement document and user manual.
5. Students should follow the steps as discussed in Software Development Life Cycle while writing dissertation and use Software Engineering Methodologies for development of deliverables, mere programming will not be sufficient. Students must note that interviewers for job are often more interested in the problem solved, alternatives that could have been tried and the benefits derived from the developed application, rather than just implementation details.
6. One Project will be submitted only by one student. However, if the nature of the project is very big & large enough to be divided in different independent big modules having an estimated required effort of minimum 06 weeks to be developed by one person, can be taken up and designed in such a way that every student will be responsible for one module and will submit only that specific module as it were a complete software project.
7. Every student has to get his / her synopsis approved from the guide.
8. The synopsis must be brief i.e., not more than 4-6 pages. It must address details like (however, students may follow the SRS format of IEEE for writing Synopsis)
 - a. Name / title of the project,
 - b. Statement about the problem,
 - c. Why the Particular topic is chosen? It must address Present State of the Art.
 - d. Objective and scope of the project,
 - e. Analysis, Design, Development & Testing Methodology,
 - f. H/W & S/W to be used,
 - g. Testing Technologies to be used,
 - h. What contribution / value addition would the project make?
 - i. Limitations / constraints of the project,
 - j. Conclusion, Future Scope for Modification,
 - k. References and Bibliography.

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9. After approval of the Synopsis, Students will need to give Two Presentations / Demonstration, as per the schedule fixed by their respective Institutions or University. First Presentation will ideally be given after Design Phase is over. Second should be given when System Testing is over. First Presentation (**Summer Training**) should be given in the first month. Second Presentation (**Projects**) is in second month. Final Project reports should be given latest by the end of the third month of the semester.
10. Summer Training report has to be submitted by **31st October of every academic year**.
11. The student will submit his/her project report/thesis in the prescribed format, as given hereunder, after the second presentation. The project report/thesis should include: -
 - a. ONE hard copy (Maroon colour with golden print) of the project report / thesis.
 - b. Soft copy of project on CD including all resource code/ compiled binary code and the manuscript in MS-Word document format.
12. Note the following guidelines with respect to Preparation of the Documentation. Please note that documentation is meant for other people, and hence it must be self-explanatory, in all respect.
 - 12.1.1 The sequence of the Pages in the Project Report will be as follows:
 1. One Transparency Sheet
 2. Title Page (Strictly as per the sample supplied)
 3. Institute's Certificate
 4. Company's Certificate
 5. Candidate Declaration of originality of work
 6. Acknowledgement.
 7. Abstract
 8. List of Figures (Strictly as per the sample supplied)
 9. List of Tables (Strictly as per the sample supplied)
 10. List of Abbreviations (Strictly as per the sample supplied)
 11. Contents (Strictly as per the sample supplied) and then body of the dissertation according to the content.
 - 12.2 The pages coming under the preview of the CONTENTS will only be numbered in the **BOTTOM** of the Page Centrally Aligned.
 - 12.3 ONE Hardbound Copies (One Original and Two Xerox) will be submitted with the Institute out of which one will be given back to the candidate. All the students are required to follow the same binding format in maroon color with back quote mentioning title of the project, name of the student and year.
 - 12.4 At the end of the Project Report Two White blank sheets must be attached.
 - 12.5 At the beginning of each chapter one blank page (Strictly as per the sample supplied) must be attached. These pages will neither be numbered nor counted in total numbering of pages. They will only indicate the beginning of a New Chapter with its learning objectives.
 - 12.6 Font size of the documentation will be *12 Times New Roman* and the pages will be one and half line spaced. The page margin will be as under: -

Top – 1 inch,	Bottom – 1 inch,
Left – 1.5 inch,	Right – 1 inch.
 - 12.7 Kindly note that all-methodological details and theoretical aspects must be written in students' own words. Copying from books or other students will not be accepted, in any case.

All students are informed not to write definition of various concepts in index, mention the topics w. r. t. to your project (i.e., how various concepts have been implemented in the project)

*** No detailed theories required**

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TEMPLATE FOR CHAPTER SCHEME

C O N T E N T S

(font size -18)

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4.3	Test Reports and Debugging	71
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- # Please note that for all the System Design (Database, Input & Output) the basic Prototype, format, Table Structure, etc. is to be discussed along with related validations, verifications & normalization. However, the sample Input & Output (Screen Snapshots) will be attached in the annexure.
- ## Under Testing, you have to discuss the approach of Testing, Test Data, Test Cases and Test Report. How Debugging has been performed, on the basis of Test Report, must be also discussed?

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Template for blank page before every chapter

CHAPTER 2 SYSTEM ANALYSIS

- 2.1 Feasibility Study
 - 2.1.1 Technical Feasibility
 - 2.1.2 Economical Feasibility
 - 2.1.3 Operational Feasibility
 - 2.1.4 Other Feasibility Dimensions
- 2.2 Analysis Methodology
- 2.3 Choice of the Platforms
 - 2.3.1 S/W used
 - 2.3.2 H/W used

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Other Templates

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LIST OF ABBREVIATIONS

Abbreviation	Description
CAD	Context Analysis Diagram
DFD	Data Flow Diagram
HIPO	Hierarchical Input Process Output

References/Bibliography:

1. Patterson D W, "Introduction to Artificial Intelligence and Expert Systems", Second Edition, 2002, Prentice Hall of India Private Ltd., New Delhi.
2. V. Rajaraman, "An Introduction to Digital Computer Design", Third Edition, 1995, Prentice Hall of India Private Ltd., New Delhi.

Note: All of the above three will be prepared on separate pages.

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Template for back-quote

INVENTORY MANAGEMENT SYSTEM STUDENT NAME ENROLLMENT NUMBER

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Course Code: BCA 371

Course Name: LINUX – OS LAB

L T/PC

0 4 2

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to:

1. Unix/Linux environment
2. Understanding of Linux commands and scripts

PRE-REQUISITES:

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Understand Linux Environment with the help of its architecture.	BT Level 1	PO1,PO2
CO2	Understand the Linux environment by using general Linux Commands.	BT Level 2	PO1,PO2,PO4
CO3	Implement Process Related commands.	BT Level 4	PO1,PO2,PO4,PO5
CO4	Implement File Permission concept.	BT Level 4	PO1,PO2,PO4,PO5
CO5	Understanding the shell script by combining commands.	BT Level 2	PO1,PO2,PO4

List of Practicals

S. No.	Detailed Statement	Mapping to CO #
--------	--------------------	-----------------

Core Practicals

1	Connect to the Linux Server and understand the basic Directory Structure of Linux.	CO1
2.	To understand help commands like:-man,info,help,whatis,apropos	CO2
3.	To understand basic directory navigation commands like cat,cd, mv, cp, rm, mkdir,rmdir ,file, pwd command.	CO2
4.	To understand basic commands like:- date,cal,echo,bc,ls,who,whoami,hostname,uname, tty,aliase	CO2
5.	To understand vi basics, Three modes of vi Editor, how to write, save, execute a shell script in vi editor.	CO5
6.	To understand process related commands like: - ps, top, pstree, nice, renice in Linux.	CO3
7	To understand how to examine and change File permissions.	CO4

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8	Set a file to be read-only with the chmod command. Interpret the file permissions displayed by the ls -l command.	CO4
9	Delete one or more directories with the rmdir command. See what happens if the directory is not empty. Experiment (carefully!) with the rm -r command to delete a directory and its content.	CO2
10	Change your directory to the directory exercises. Create a file in that directory, named the file as example1 using the cat command containing the following text: water, water everywhere and all the boards did shrink; water, water everywhere, no drop to drink.	CO2
11	Write basic shell script to display the table of a number.	CO5
12	Write basic shell script to input a character from user and then check whether it is uppercase, lowercase or digit.	
13	Write basic shell script to calculate factorial of a number.	
14	Write basic shell script to input the month number and generate corresponding calendar.	
15	Write basic shell script to list all directories.	
16	Write basic shell script to display greatest of three numbers.	
17	Write basic shell script to check whether the number entered by user is prime or not.	
Note: 1. 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		

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Course Code: BCA 373

Course Name: Practical - XI CG Lab

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0 4 2

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to:

1. Concept of Computer graphics, the coordinate system of display devices.
2. Implementing various scan converting algorithms.
3. Methods of drawing of graphic objects on the display devices.
4. Generating complex graphic objects
5. Implementation of various 2D transformations
6. Implementing line clipping algorithms

PRE-REQUISITES:

Knowledge of Programming in C/C++ is preferable

Understanding of various functions included in graphics.h header files

COURSE OUTCOMES (COs):

After completion of this course, the learners will be able to:

CO #	Detailed Statement of the CO	BT Level	Mapping to PO #
CO1	Develop basic computer generated graphic and drawing of graphic objects on 2D display devices.	BTL3	PO1, PO6
CO2	To perform various algorithms for generating objects	BTL4	PO4
CO3	To implement various 2D transformation operations through matrices.	BTL4	PO4, PO8
CO4	Implementation of cohen-sutherland line clipping algorithm.	BTL3	PO1

List of Practicals

S. No.	Detailed Statement	Mapping to CO #
Core Practicals (Implement minimum 8 out of 10 practicals)		
1.	Drawing objects like circle, rectangle, polygon etc using graphic function	CO1
2.	Graphics Inbuilt functions	CO2
3.	Line Drawing Algorithms (DDA & Bresenham's Algorithm)	CO2
4.	Circle Algorithms	CO2
5.	Translation in 2D	CO3
6.	Rotation in 2D	CO3
7.	Scaling in 2D	CO3
8.	Reflection in 2D	CO3
9.	Shearing in 2D	CO3
10.	Cohen Sutherland's Algorithm	CO4

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Application Based Practicals (Implement minimum 5 out of 10 practicals)		
11.	Program to rotate a circle outside another circle	CO1
12.	Program to draw Flying Balloons	CO1
13.	Show Bouncing Ball Animation	CO2
14.	Draw pie chart of family income and Expenditure	CO2
15.	Show changing radius of circle	CO2, CO3
16.	Program to rotate a coin on table	CO3
17.	Making an Analog Clock	CO3
18.	Draw a moving cycle	CO3, CO4
19.	Design a screensaver	CO4
20.	Show Moving Car Animation	CO3, CO4
Note: 1. In total 15 practicals to be implemented. 2 additional practical may be given by the course instructor. 2. This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.		